

Having thus described the preferred embodiments, the invention is now claimed to be:

1. An upright vacuum cleaner comprising:
an upright housing;

a nozzle base hingedly interconnected with the upright housing, said nozzle base including a main
5 suction opening in an underside thereof;

a cyclonic airflow chamber defined in said upright housing and adapted for separating dust and dirt from a cyclonically circulating suction airstream, said main suction opening being in fluid communication with
10 said cyclonic airflow chamber;

a suction source located in one of said upright housing and nozzle base and having a suction airflow inlet in fluid communication with said cyclonic chamber and a suction airflow outlet;

15 a main filter assembly located in said cyclonic chamber upstream from said suction source for filtering dust and dirt from a suction airstream that passes through said cyclonic airflow chamber, said main filter element extending upwardly within said cyclonic airflow
20 chamber from a floor of a dirt container portion of said housing that defines a lower portion of said cyclonic airflow chamber and that is adapted for receiving and retaining dirt and dust separated from said suction airstream;

25 a conduit depending into said cyclonic airflow chamber from an upper wall of said housing, said conduit axially aligned and mating with an upper end of said main filter assembly whereby said main filter assembly and said conduit together define a hollow column structure in said cyclonic airflow chamber.

2. The upright vacuum cleaner as set forth in claim 1 further comprising:

5 a final filter assembly connected in fluid communication with said suction airflow outlet of said suction source and adapted for filtering said suction airstream exhausted by said suction source prior to said suction airstream being dispersed into the atmosphere, wherein said final filter assembly comprises a high efficiency particulate arrest (HEPA) filter medium.

3. The upright vacuum cleaner as set forth in claim 1 wherein said suction source is housed in said nozzle base and communicates with said cyclonic airflow chamber through said depending conduit, and wherein said
5 main suction opening in said nozzle base communicates with said cyclonic airflow chamber through an airstream inlet located at an upper portion of said cyclonic airflow chamber, whereby, upon activation of said suction source, dust and dirt from a surface being cleaned are
10 entrained in a suction airstream, said suction airstream traveling:

(a) from said main suction opening in said nozzle base upwardly and into said cyclonic airflow chamber through said airstream inlet;

15 (b) downwardly from said airstream inlet and in a cyclonic fashion within said cyclonic airflow chamber so that said entrained dust and dirt are separated from said suction airstream and deposited in said dirt container;

20 (c) through said main filter assembly and upwardly through said depending conduit; and,

(d) downwardly to said suction source housed in said nozzle base.

4. The upright vacuum cleaner as set forth in claim 3 wherein said main filter assembly includes a main filter element that comprises an expanded polytetrafluoroethylene (PTFE) membrane.

5. The upright vacuum cleaner as set forth in claim 4 wherein said filter medium of said main filter element blocks at least 99% of particles having a size of at least $0.3\mu m$.

6. The upright vacuum cleaner as set forth in claim 1 wherein said dirt container, including said filter assembly, is adapted for pivoting movement between an open position, providing access to an interior region of said dirt container, and a closed position wherein said dirt container, together with an upper portion of said housing, defines said cyclonic airflow chamber.

7. The upright vacuum cleaner as set forth in claim 6 wherein said main filter assembly projects upwardly from said floor of said dirt container to an upper end of said filter assembly located at a height that corresponds to a height of an upper edge of said dirt container, and wherein said depending conduit projects downwardly from said upper housing wall to a lower edge located at a height that corresponds to a height of a lower edge of said upper housing portion, said upright vacuum cleaner further comprising:

a gasket connected to one of said lower edge of

said depending conduit and upper end of said main filter
assembly, said gasket effecting a fluid-tight seal
between said depending conduit and said main filter
15 assembly when said dirt container is in its closed
position.

8. The upright vacuum cleaner as set forth in
claim 7, wherein said lower edge of said upper housing
member, said upper edge of said dirt container, and said
upper end of said main filter assembly are arranged
5 parallel to each other and are each inclined relative to
a horizontal plane when said dirt container is in its
closed position.

9. The upright vacuum cleaner as set forth in
claim 1 wherein further comprising:

an auxiliary filter element positioned in said
depending conduit and adapted to filter said suction
5 airstream before said suction airstream passes to said
suction source.

10. A vacuum cleaner comprising:

a first housing member defining a cyclonic
airflow chamber adapted for separating entrained dirt and
dust from a circulating airstream;

5 a second housing member defining a main suction
opening;

a first conduit for fluidically connecting said
main suction opening to an inlet of said cyclonic airflow
chamber;

10 a suction source having a suction airstream
inlet and a suction airstream outlet and adapted for

generating and maintaining a suction airstream flowing from said inlet downstream to said outlet;

15 a second conduit for fluidically connecting an outlet of said cyclonic airflow chamber to said suction airstream inlet of said suction source; and,

20 a main filter assembly including a filter medium comprising a selectively permeable plastic material, said main filter assembly located in said cyclonic chamber so that a suction airstream moving from said main suction opening to said inlet of said suction source by way of said cyclonic airflow chamber passes through said filter medium after said airstream moves in a cyclonic fashion within said cyclonic airflow chamber.

11. The vacuum cleaner as set forth in claim 10 wherein said main filter assembly is cylindrical in shape.

12. The vacuum cleaner as set forth in claim 11 wherein said filter medium of said main filter element comprises a pleated planar material.

13. The vacuum cleaner as set forth in claim 11 wherein said filter medium of said main filter assembly is supported on an internal open framework cylindrical support structure.

14. The vacuum cleaner as set forth in claim 11 wherein said main filter assembly is arranged coaxial with a central longitudinal axis of said cyclonic airflow chamber.

15. The vacuum cleaner as set forth in claim 14 wherein said inlet of said cyclonic airflow chamber is horizontally oriented and arranged so that a suction airstream entering said cyclonic airflow chamber through said inlet of said cyclonic chamber moves cyclonically about said main filter element.

16. The vacuum cleaner as set forth in claim 10, wherein said filter medium of said main filter assembly blocks passage of at least 99% of particulates that have a size of at least $0.3\mu\text{m}$.

17. The vacuum cleaner as set forth in claim 10 further comprising:

an auxiliary filter located upstream relative to said suction airstream inlet of said suction source and downstream relative to said main filter assembly, said auxiliary filter adapted for filtering particulates from a suction airstream exiting said cyclonic airflow chamber prior to said residual contaminants entering said suction airstream inlet of said suction source.

18. A vacuum cleaner apparatus comprising:

a nozzle defining a main suction opening;

a main suction source in communication with said main suction opening and adapted for establishing a suction airstream that moves into said main suction opening and downstream into said suction source;

a cyclonic chamber placed in communication with and between said main suction opening and said suction source, said cyclonic chamber adapted for imparting a cyclonic flow to said suction airstream whereby a portion

of particulates entrained in said suction airstream are separated from said suction airstream leaving residual particulates entrained in said suction airstream; and,

15 a filter assembly located in said cyclonic chamber, said filter assembly including a filter membrane placed in covering relation with an outlet of said cyclonic chamber whereby said residual particulates entrained in said suction airstream are blocked from exiting said cyclonic chamber, said filter assembly
20 adapted for being selectively removed from said cyclonic chamber, washed to remove particulates from said membrane, and replaced in said cyclonic chamber for further filtering operations.

19. The vacuum cleaner apparatus as set forth in claim 18, wherein said filter membrane comprises a polytetrafluoroethylene (PTFE) material.

20. The vacuum cleaner apparatus as set forth in claim 19 wherein said filter membrane blocks at least 99% of particles having a size of at least $0.3\mu\text{m}$.

21. A vacuum cleaner comprising:

a housing defining a cyclonic airflow chamber for separating contaminants from a suction airstream, said housing further defining a suction airstream inlet
5 and a suction airstream outlet in fluid communication with said cyclonic airflow chamber;

a nozzle base including a main suction opening, said main suction opening being fluidically connected with said cyclonic airflow chamber inlet;

10 an airstream suction source having an inlet

fluidically connected to said cyclonic airflow chamber outlet and a suction source exhaust outlet, said suction source selectively establishing and maintaining a suction airstream from said nozzle main suction opening to said
15 suction source exhaust outlet;

a main filter assembly positioned in fluid communication between said cyclonic airflow chamber and said suction source for filtering residual contaminants from said suction airstream downstream relative to said
20 cyclonic airflow chamber, said main filter assembly comprising a polymeric filter membrane.